Supplementary material

Supplementary Method

Thought probes

We used a thought probe methodology (Seli, 2016, Smallwood *et al.*, 2004) to ask participants at the end of each block whether they were focused on the task (task-related thoughts) or were mind wandering with threat-related or no threat-related task-unrelated thoughts. A single form contained the following questions repeated 8 times (corresponding to one set of question for each of the 8 blocks of a sequence): 1) what were you thinking about just now? a) About the task you are doing at that exact moment, b) anxious thoughts, c) thinking about something unrelated?

Prior to starting the test, subjects were informed that they would have to report their dominant thoughts according to three categories: task-related thoughts, threat-related task-unrelated thoughts, or threat-unrelated task-unrelated thoughts. They were told that a task-related thought (TRT) was thinking about performing the task (choice a) above), a threat-related thought (threatTUTs) was thinking about the threat during the experiment (choice b) above). And a task-unrelated and threat-unrelated thought (nonthreatTUTs) was thinking about something else other than the task or the threat of shock (choice c) above). They were asked to make a single selection among the three choices.

Data analysis

Signal-detection indexes

Signal-detection sensitivity (d_L) and response bias (C_L) scores were calculated for each participant as described in (McVay and Kane, 2009) using the formulas for logistic distributions (Snodgrass and Corwin, 1988).

d_L=ln {[H(1−FA)]/[(1−H)FA]}, and C_L=0.5[ln{[(1−FA)(1−H)]/ [(H)(FA)]}],

where ln = natural log, H =hit proportion, and FA=false-alarm proportion. Individual hit or false-alarm rates of 0 and 1 were adjusted by .01. A negative C_L reflects a go bias.

Thought probes

The three types of thought probes (TRTs, nonthreatTUTs, threatTUTs) were averaged separately within Task (no task, task) and Condition (safe, threat). Because of multicollinearity issues (the total thought scores equal 1 in each condition), each thought type was analyzed separately.

Supplementary Results

Performance in each anxiety disorder

Supplementary Table S1 below shows the performance scores for each anxiety disorder. Visual observation of the scores shows similar pattern of responses among the three groups and this is confirmed by statistical analyses. We conducted a Group (GAD, GAD/SAD, SAD) x Condition (safe, threat) on each score that showed a significant group difference in the main analysis. Results show no significant Group difference (Go correct hit, F(2,38)=.29, ns, η_P^2=.01; Nogo correct omission, F(2,38)=.27, ns, η_P^2=.02; C_L, F(2,38)=.53,ns, η_P^2=.0007; skill index, F(1,80)=.22, ns η_P^2=.001).

Supplementary Table S1. *Mean (SEM) performance scores for the healthy controls and the three anxiety disorder groups*

	Controls		**GAD**		**GAD/SAD**		**SAD**	
	safe	threat	Safe	threat	safe	threat	safe	threat
Nogo correct omission[a]	.76 (.02)	.80 (.02)	.73 (.02)	.80 (.02)	.77 (.02)	.81 (.03)	.78 (.03)	.80 (.06)
Go correct hit[b]	.91 (.01)	.90 (.01)	.84 (.02)	.85 (.02)	.87 (.02)	.87 (.02)	.89 (.02)	.85 (.03)
Go RT (msec)[c]	387.8 (16.2)	377.4 (14.7)	317.1 (12.9)	316.1 (14.4)	345.9 (15.4)	341.5 (16.7)	353.0 (37.0)	341.5 (16.7)
Skill index[d]	2.05 (.07)	2.27 (.08)	2.36 (.11)	2.59 (.13)	2.29 (.10)	2.45 (.12)	2.30 (.19)	2.47 (.26)
C_L[e]	-.63 (.11)	-.53 (.11)	-.43 (.12)	-.25 (.18)	-.48 (.09)	-.18 (.15)	-.47 (.13)	-.12 (.23)
d_L[f]	3.98 (.24)	4.51 (.25)	2.98 (.29)	3.73 (.45)	3.56 (.31)	4.17 (.42)	3.58 (.13)	3.76 (.23)

[a] Nogo trials followed by no button press; [b] Go trials followed by button press; [c] RT to correct button press to go trials; [d] 1000*(mean nogo accuracy ratio/ mean go-trial RT) (Saucedo Marquez *et al.*, 2013, Seli, 2016, Seli *et al.*, 2016). [e] Response bias index. [f] Signal-detection sensitivity index.

Thought probes

Thought types (TRTs, nonthreatTUTs, threatTUTs) are shown in Supplementary Table S2. They were analyzed separately using the same ANOVA as for the startle data. The result of this analysis is shown in Supplementary Table S3. In this section, we follow up on key effects that implicate group differences. The TRT data showed a Group x Condition interaction, reflecting reduced TRTs from the safe to the threat ($F(1,40)=5.6$, $p=.02$) condition in the patients with no change in the control ($F(1,40)=.1$, ns). As a result, the rate of TRTs was the same in the two groups in the safe condition ($F(1,80)=1.2$) but it was lower in the patients compared to the controls in the threat condition ($F(1,80)=12.6$, $p<.0009$). For threatTUT, there was a group main effect, due to higher overall rates of threatTUTs in the patients compared to the controls.

Supplementary Table S2. *Mean (SEM) of rates of each thought types*

		Controls		Patients	
Tasks	**Thought types**	Safe	Threat	Safe	Threat
Control task	TRTs[a]	.28 (.05)	.33 (.05)	.25 (.04)	.15 (.03)
	nothreatTUTs[b]	.67 (.06)	.40 (.05)	.66 (.04)	.39 (.05)
	ThreatTUTs[c]	.05 (.02)	.27 (.05)	.09 (.03)	.46 (.05)
GNG	TRTs	.57 (.05)	.62 (.05)	.48 (.06)	.41 (.05)
	nothreatTUTs	.39 (.04)	.19 (.04)	.42 (.05)	.23 (.04)
	ThreatTUTs	.04 (.02)	.19 (.04)	.10 (.03)	.36 (.05)

[a]Task-related thoughts; [a] no threat-related/task-unrelated thoughts; [a] Threat-related/task-unrelated thoughts.

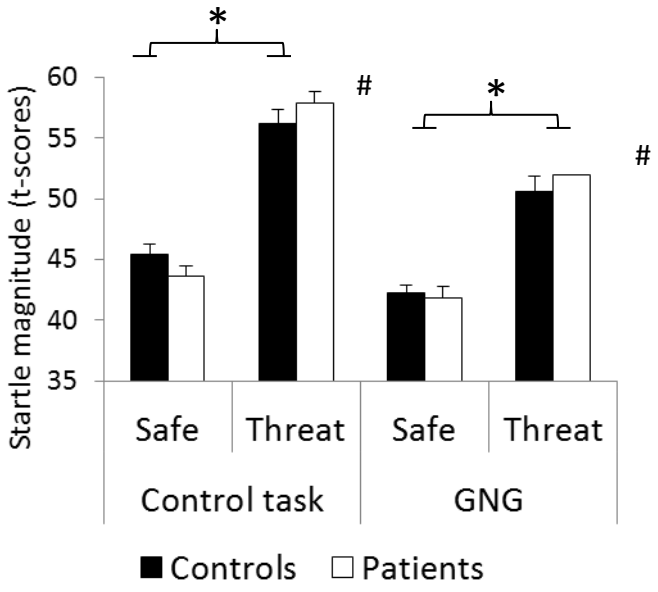
Supplementary Table S3. *Statistical analysis (ANOVAs) of thought probes*

	TRTs	**threatTUTs**	**nonthreatTUTs**
Group	F(1,80)=6.1, p=.01, η_P^2=.078	F(1,80)=9.7, p=.003, η_P^2=.108	F(1,80)=.4, ns
Condition	F(1,80)=.5, ns	F(1,80)=51.6, p<.0009, η_P^2=.392	F(1,80)=38.8, p<.0009, η_P^2=.331
Task	F(1,80)=65.0, p<.0009, η_P^2=.452	F(1,80)=5.9, p=.02, η_P^2=.069	F(1,80)=33.2, p<.0009, η_P^2=.297
Group x Condition	F(1,64)=8.2, p=.005, η_P^2=.088	F(1,80)=3.4, p=.069, η_P^2=.046	F(1,80)=.5, ns
Group x Task	F(1,80)=.4, ns	F(1,80)=.03, ns	F(1,80)=.5, ns
Condition x task	F(1,80)=.1, ns	F(1,80)=6.7, p=.01, η_P^2=.077	F(1,80)=1.4, ns
Group x Condition x task	F(1,80)=.1, ns	F(1,80)=.1, ns	F(1,80)=.9, ns

Startle

The startle data, expressed in T-scores, are shown in Supplementary Fig. S1. These data were analyzed with a group (comparisons, patients) x task (control task, GNG) x condition (safe, threat) ANOVA. As expected, startle magnitude was larger in the threat compared to the safe condition (F(1,80)=238.7, p<.0009, η_P^2=.749), but this effect was qualified by a group x

condition interaction (F(1,80)=5.2, p=.02, η_P^2=.661), reflecting greater increased in startle magnitude from the safe to the threat condition (i.e., fear-potentiated startle) in the patients compared to the comparisons. Startle was also reduced during the GNG task compared to the no task (F(1,80)=23.3, p<.0009, η_P^2=.225), and startle potentiation tended to be smaller during the GNG task compared to the no task (task x Threat: F(1,80)=3.5, p=.06, η_P^2=.042). There was no other significant effect (all p>.1).



Supplementary Fig. S1. Startle magnitude (T-scores)in each condition in the two groups. Error bars are sem. * for a significant (p<.05) overall difference between the safe and the threat conditions; # for significant (p<.05) greater startle potentiation in the patients compared to the control group.

Supplementary References

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